

Aircraft Management Proposal for Grand Canyon National Park

Prepared by the Quiet Canyon Coalition

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A. Proposal Summary

Commercial Tourist Aircraft

1. East End Tours (Map 1)

(a) All east-end tours (helicopters and fixed wing) use a modified Dragon corridor September 16 through June 30.

(b) All east-end tours (helicopters and fixed wing) use a modified Zuni corridor July 1 through September 15. The off-season route could be used temporarily as a weather alternate, if required.

(c) Existing Dragon and Zuni routes are modified as shown on map 1, to minimize impacts on the Nankoweap Basin, Hermit Basin, Grandview campsites, and frontcountry viewpoints.

(d) Retain existing altitudes, curfews, and annual allocations (caps on flights).

2. Shuttle flights (Maps 2 & 3)

(a) North Las Vegas–Tusayan shuttles follow a modified BDN route, shown on Map 3, to minimize impacts on the Surprise Basin (Sanup Plateau) and West Rim (west of Hermit). This route passes north of Mt. Dellenbaugh, crosses the Canyon about river mile 193, and has a dogleg southwest of the Tusayan airport (GCN) to keep it 10 nautical miles (NM) south of the park boundary west of Hermit.

(b) Tusayan–Boulder shuttles follow a modified BDS route south of the Canyon, outside the SFRA.

(c) In consultation with the Havasupai, insert a dogleg on the Tusayan–Supai helicopter shuttle route (Brown 6) to minimize impacts along the West Rim.

(d) No new restrictions on existing Hualapai flights (Grand Canyon West, Over-the-Edge, Whitmore–Bar Ten) or other West End tours, other than #3 below.

3. Noise emission compliance

By 2008, complete the phase-in of tour aircraft that meet the noise emission standards adopted by the agencies. Many tour aircraft and helicopters already comply.

General Aviation

4. Adjust flight-free zones (Maps 4 & 5)

(a) Close two general aviation corridors through the eastern Flight Free Zones. About 61% of the Canyon's length, or 170 of its 277 river miles, would remain open to low or medium altitude GA at the existing minimum altitudes, averaging about 2500 feet AGL above the Canyon rims.

(b) To prevent high-performance aircraft from evading the purpose of the Flight Free Zones, raise the ceiling of the eastern FFZs to the SFRA ceiling of 18,000 feet MSL. The Sanup FFZ would remain as is (minimum altitude 8000 feet MSL, or about 1500 feet AGL above the rims).

(c) Adjust the boundaries of the Bright Angel and Desert View FFZs slightly, to match the modified Dragon and Zuni tour routes

(d) In the vicinity of Kanab Basin, adjust the boundary of the FFZ several miles north.

(e) Close the Fossil Canyon GA Corridor but retain the Tuckup GA corridor.

(f) Retain one 4 NM wide GA corridor in the east end, open seasonally, directly over the corresponding seasonal tour route (Dragon or Zuni).

(g) Establish a local hotline for reporting illegal flights (i.e., flights directly through Flight Free Zones or below the rim).

Jets

5. Move jet routes away from the Heart of Park (Maps 6 & 7)

As shown on Map 6, in the southeastern Heart of the Park, move jet routes about 5 NM outside the Canyon rim or park boundary. This would create a high-altitude flight free polygon, 42 NM north-south by 52 NM east-west. This figure is bounded by parallels 35°53' and 36°35' north and by meridians 111°42' and 112°47' west. (In arcminutes, the boundaries are 2153' N, 2195' N, 6702' W, and 6767' W.)

This flight free zone would require moving two Phoenix bundles east or west, a diffuse Los Angeles bundle south, one Las Vegas bundle slightly north, and one Las Vegas bundle slightly south. However, there would be no disruption of national transportation patterns.

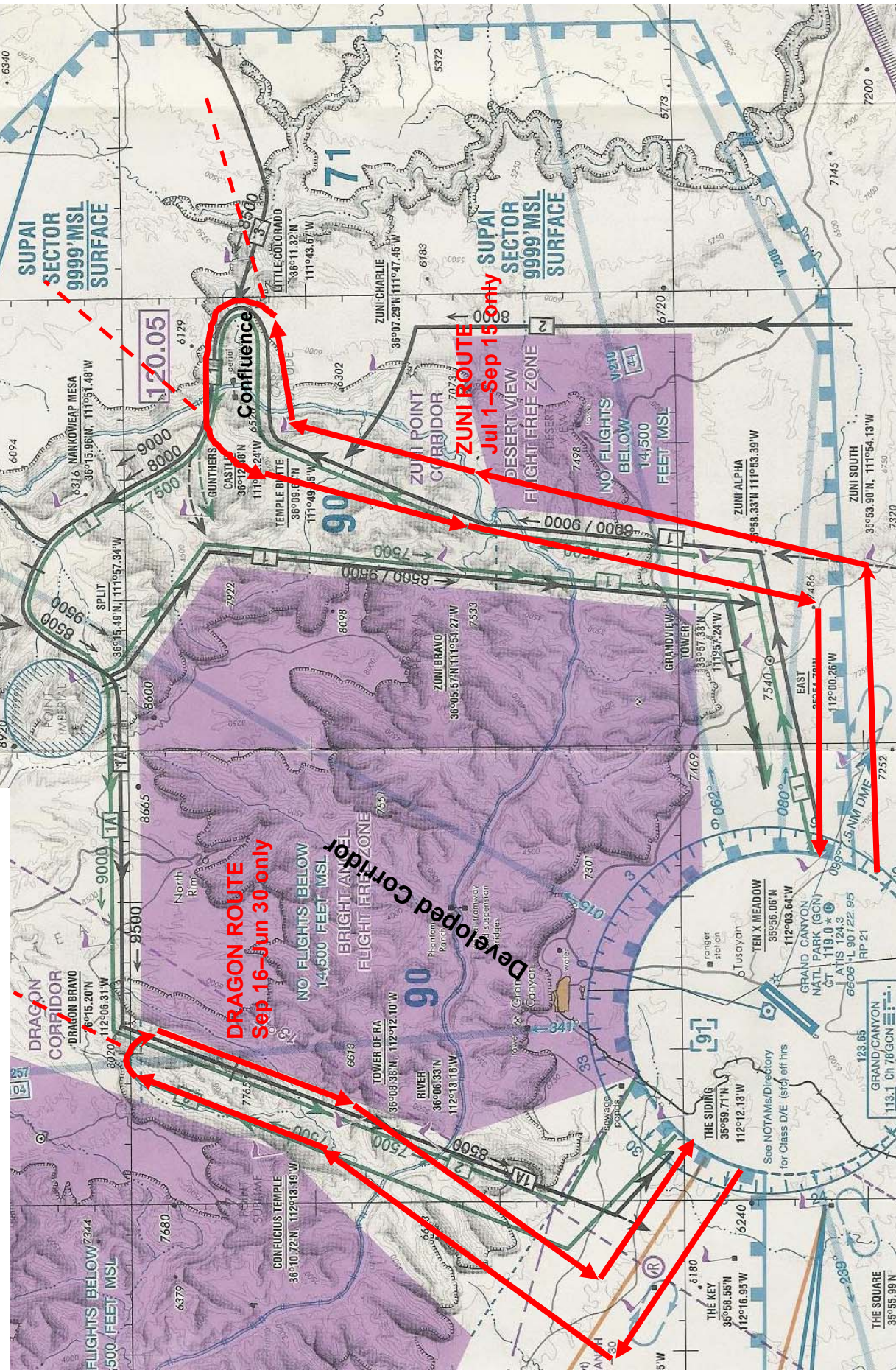
This airspace could be temporarily used as an emergency or weather alternate, if required.

Map 1

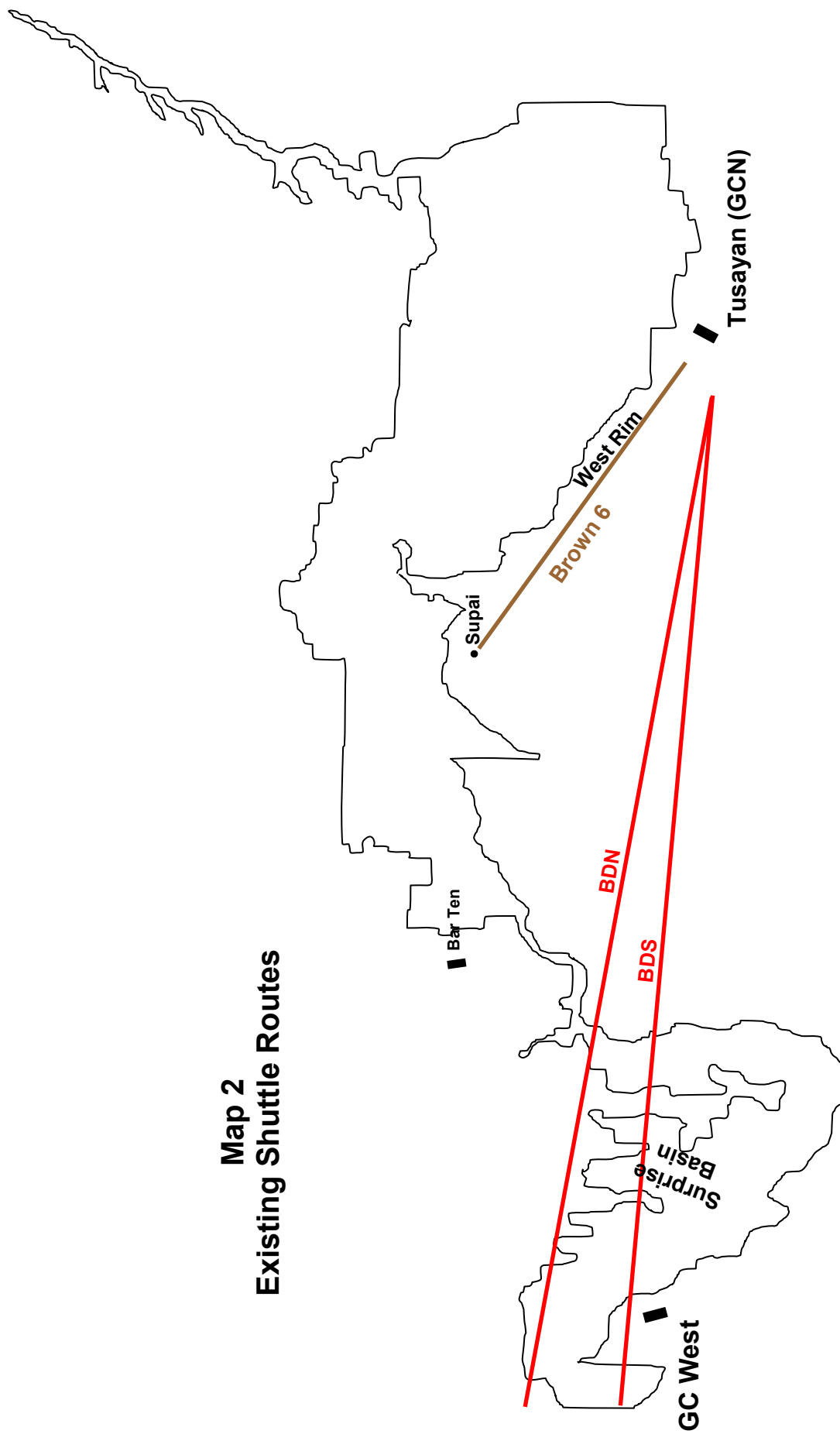
Proposed East End Air Tour Routes

— Main route

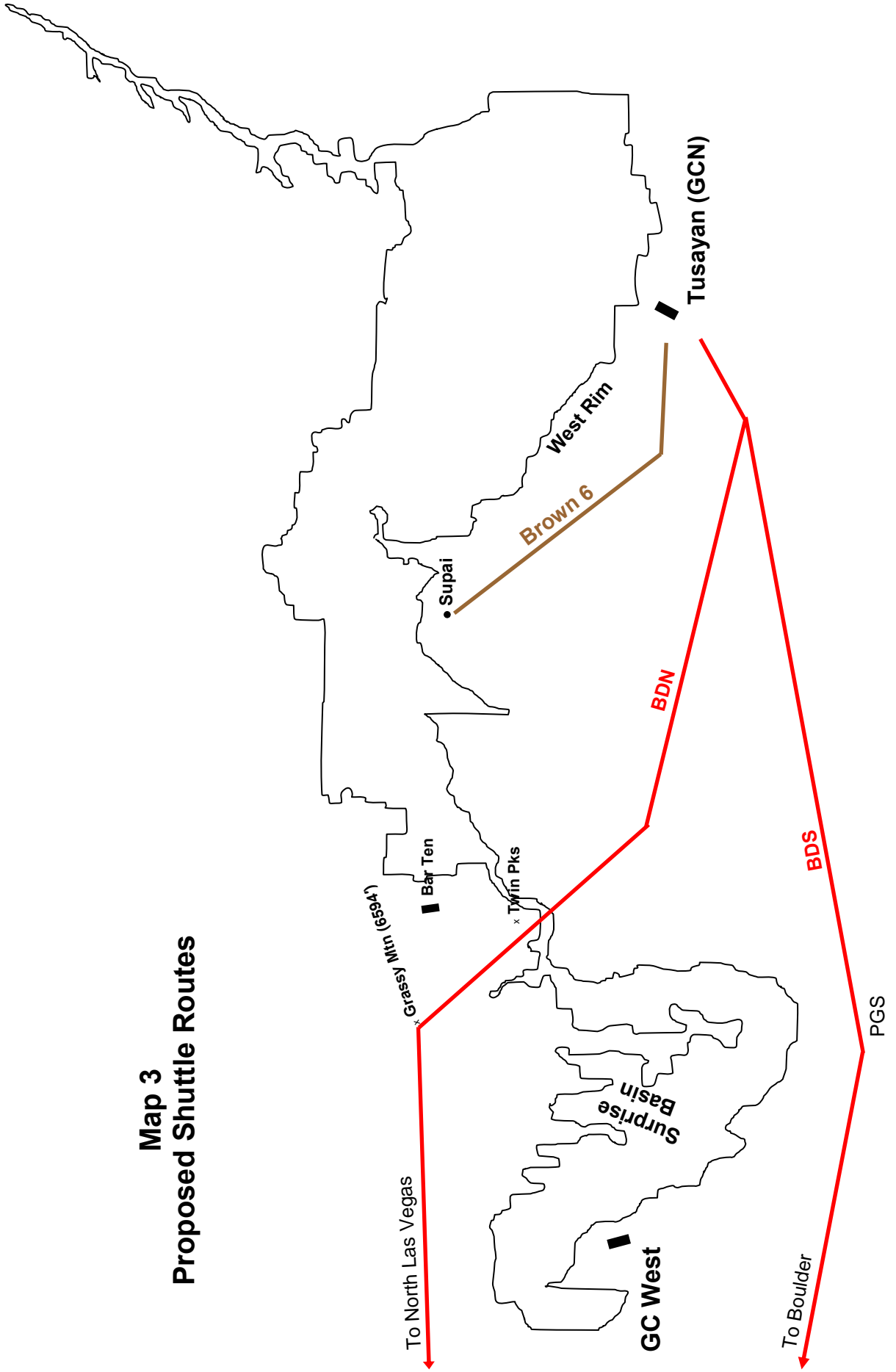
— Auxiliary entry/exit (occasional use)



Map 2
Existing Shuttle Routes



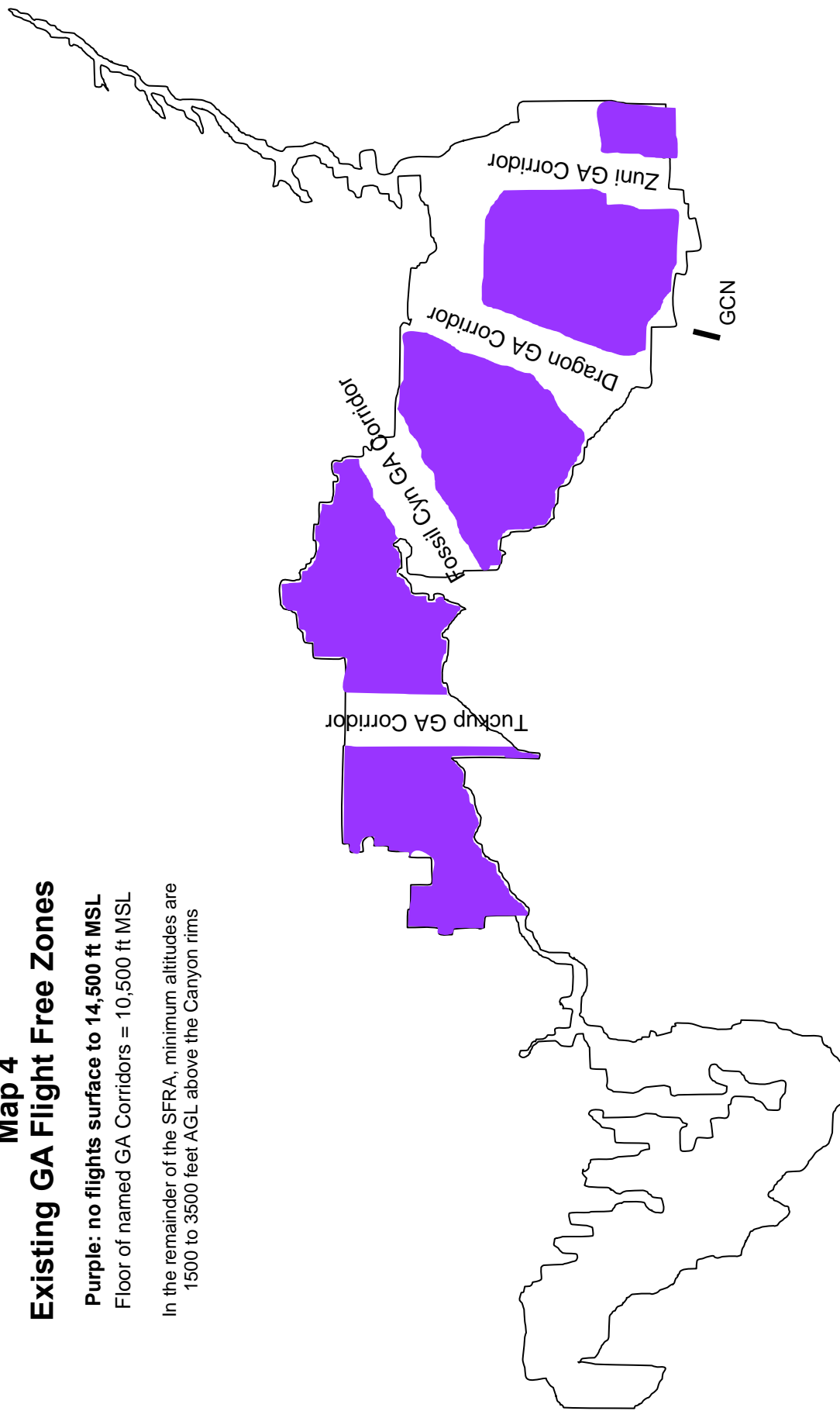
Map 3
Proposed Shuttle Routes



Map 4 Existing GA Flight Free Zones

Purple: no flights surface to 14,500 ft MSL
Floor of named GA Corridors = 10,500 ft MSL

In the remainder of the SFRA, minimum altitudes are
1500 to 3500 feet AGL above the Canyon rims



Map 5

Proposed GA Flight Free Zones

Purple: no flights from surface to 18,000 ft MSL

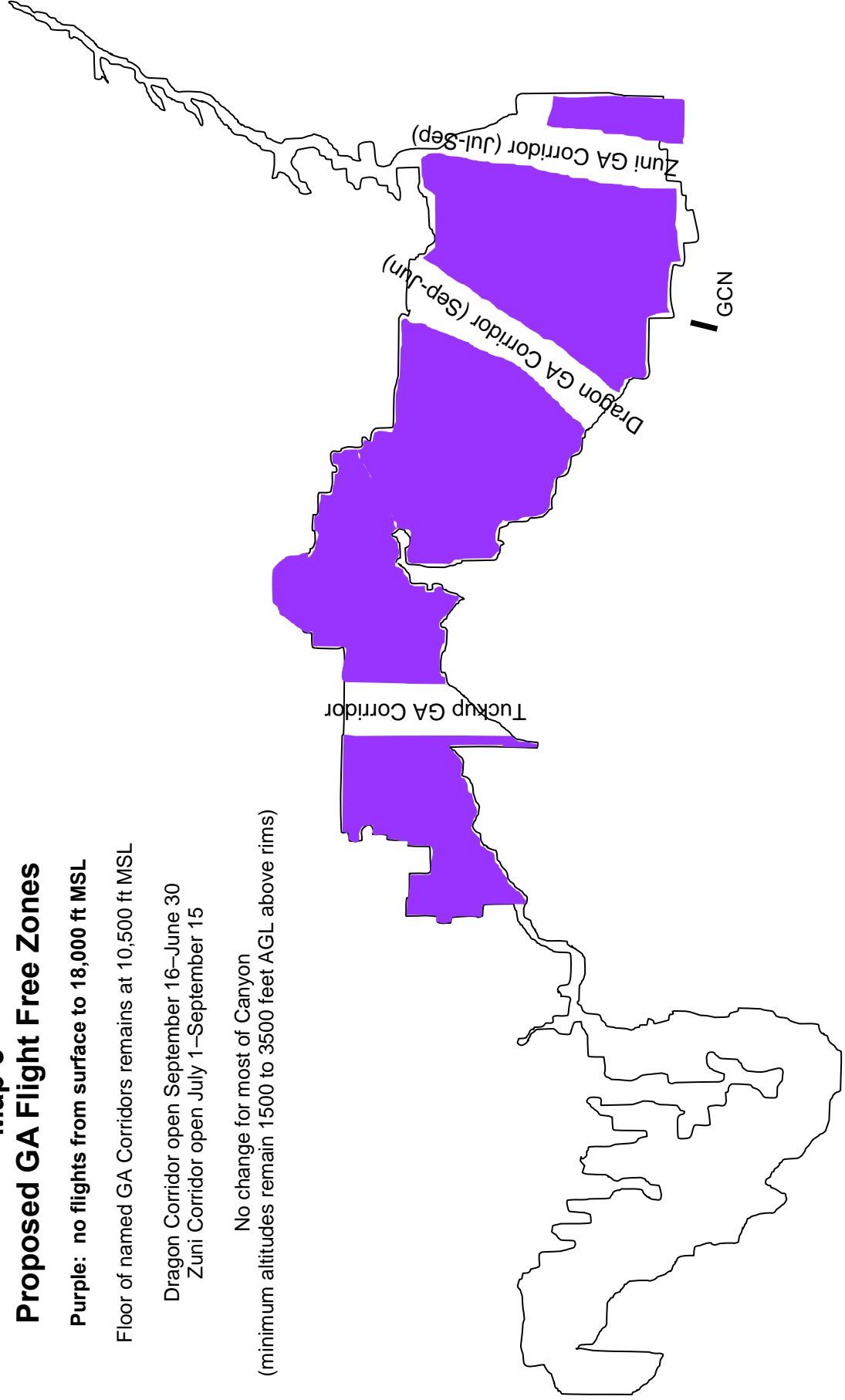
Floor of named GA Corridors remains at 10,500 ft MSL

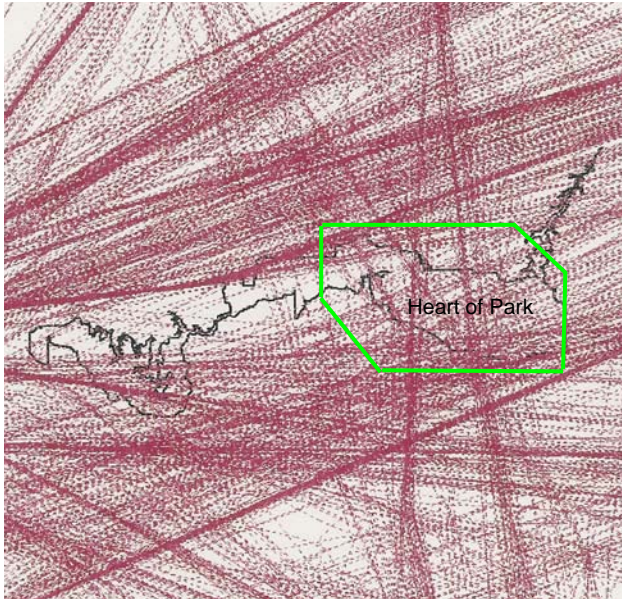
Dragon Corridor open September 16–June 30

Zuni Corridor open July 1–September 15

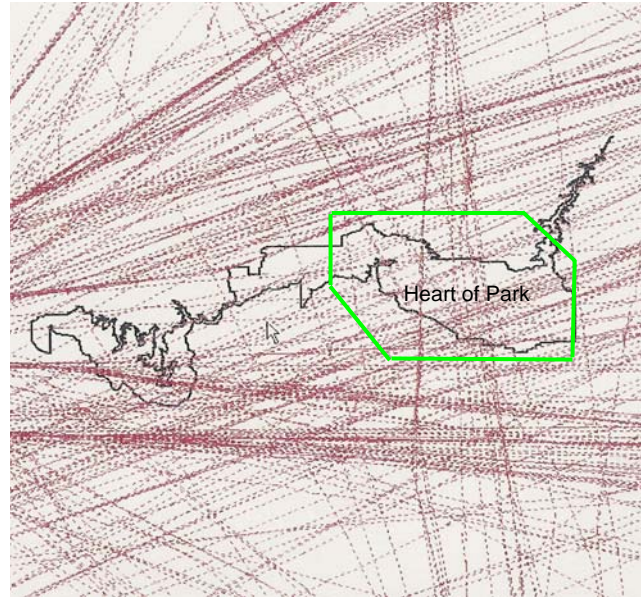
No change for most of Canyon

(minimum altitudes remain 1500 to 3500 feet AGL above rims)

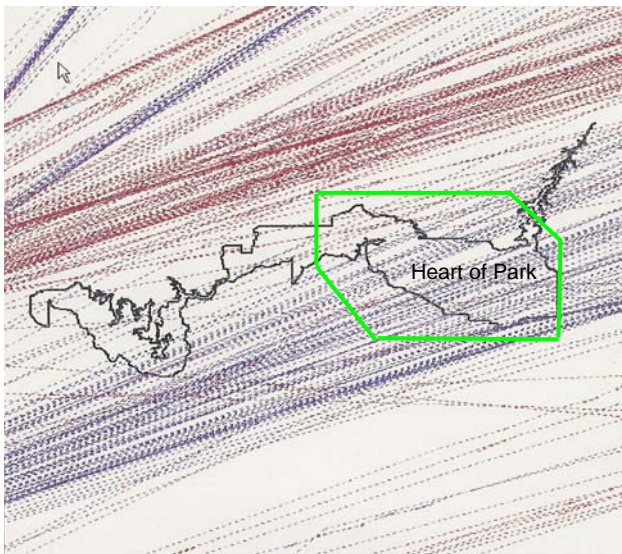




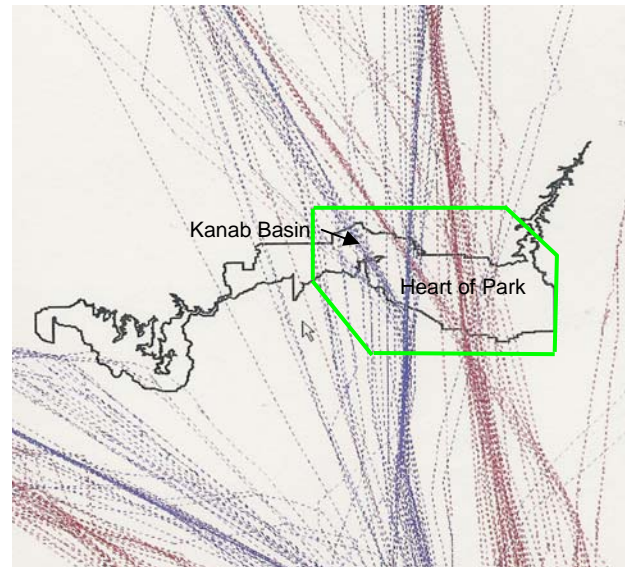
A. All daytime flights (07:00–19:00).



B. All nighttime flights (19:00–07:00).



C. Los Angeles tracks.



D. Phoenix tracks.

Map 6 Jet Tracks

Date recorded: August 31, 2003

Black outline: Park boundary

For airport-specific tracks (C through E)

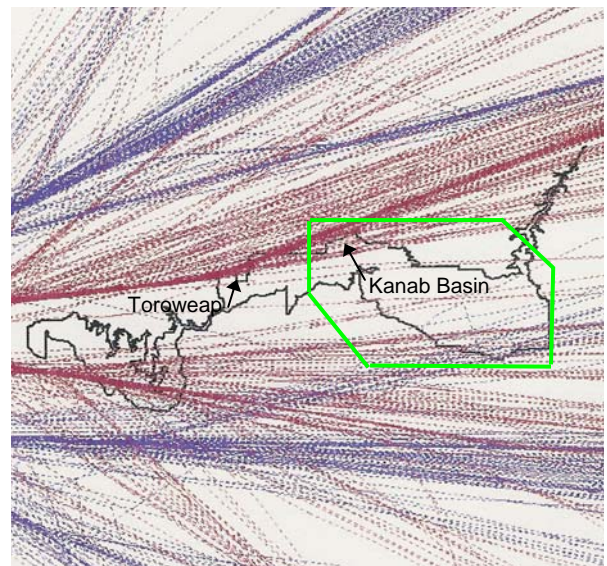
Blue: departing flights

Red: arriving flights

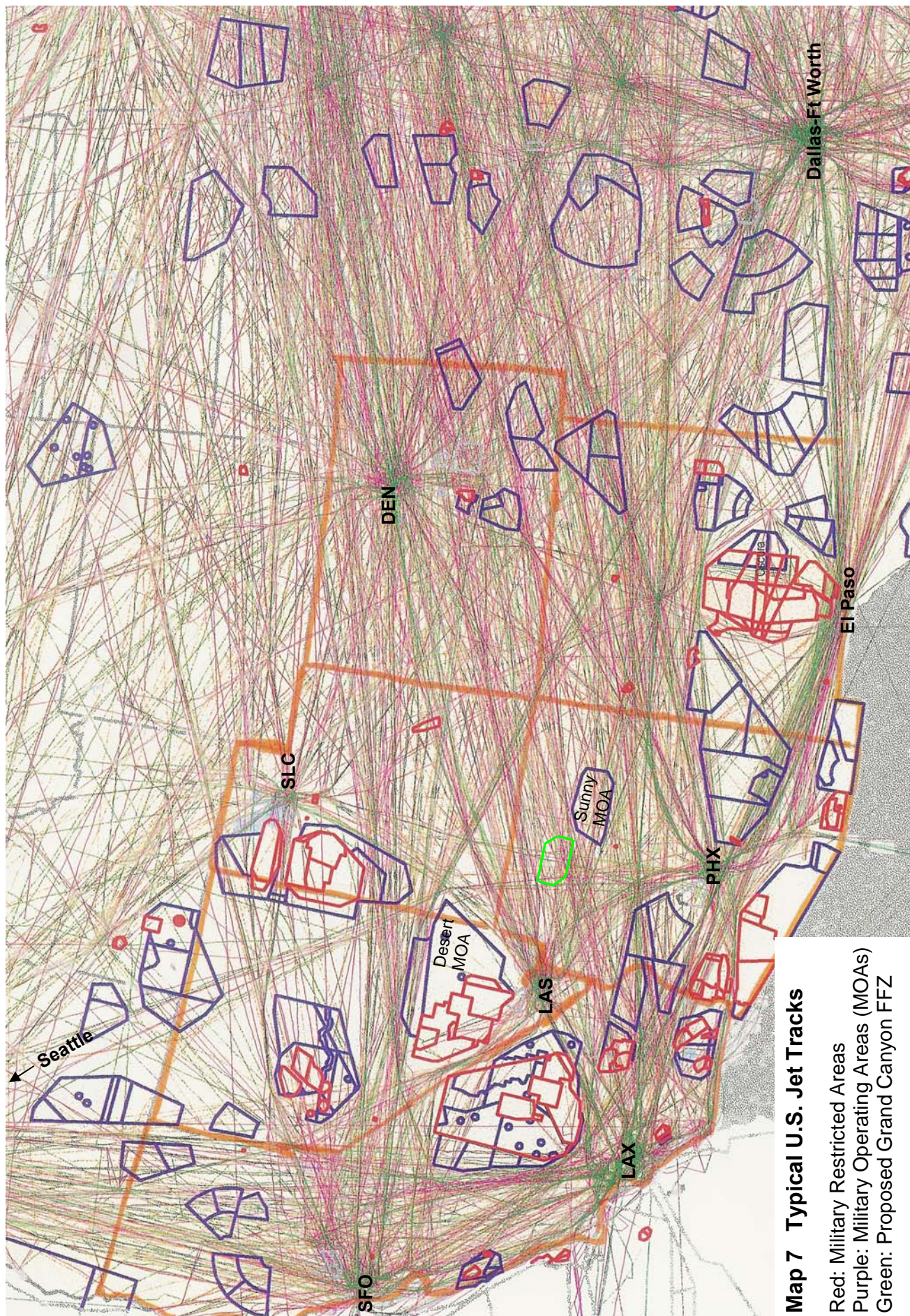
Green outline: proposed high-altitude flight-free area above 18,000 ft MSL (approximately 42 NM by 52 NM)

Scale: 10 NM —

Tracks source: Federal Interagency Committee on Aviation Noise (FICAN), *Assessment of Tools for Modeling Aircraft in the National Parks*, 2005 March 18, 160 pages. Appendix C.



E. Las Vegas tracks.



B. Rationale and Impact Analysis

1. Issue overview

Aircraft are by far the most pervasive environmental problem in Grand Canyon National Park. Away from the river and developed areas, the sight and sound of aircraft is often the only perceptible human impact. In many locations, air traffic is so heavy one can hear four or five machines simultaneously.

In the cooler months, man-made cirrus haze created by diffused jet contrails is the most noticeable form of air pollution over the Canyon.

2. Goals

- Comply with the 1987 Overflights Act.
- “Maximize protection to the backcountry.” (Senator McCain, legislative history of the Act.)
- Allow backcountry visitors to make viable trips and experience solitude and genuine natural quiet (no aircraft audible) during at least some months of the year.
- Protect Native American cultural sites.
- Allow continued air tours, both commercial and private, with no disruption of the national air transportation system.

3. Priorities

As requested by NPS, we have identified the key areas for noise protection:

Our first priority is the Heart of the Park, i.e., the historic park (Saddle Mountain to Havasu Creek, river miles 50 to 155), including the Kanab and Deer Creek Basins on the north side of the river. In addition to many important trails and routes, permanent streams and waterfalls, prime forests and meadows, and archaeological and historic sites, this area includes the park’s eight most scenic and panoramic backcountry rim viewpoints. From west to east, they are Kanab Point, Great Thumb Point, Fire Point, Havasupai Point, Point Sublime, Cocopa Point, Cape Final, and Cape Solitude. Half of these are accessible to the handicapped (by dirt road); the other half on foot.

Our second priority for protection is Marble Gorge, the Surprise Basin, and Toroweap Overlook.

These priorities are consistent with the NPS backcountry and river management plans.

4. Overall impact of proposal

The five-point plan summarized on page 2 would restore genuine natural quiet to half the park, including nearly all of the Heart of the Park. Within this restored half, virtually no aircraft would be audible, during at least some months of the year.

This was the intent of the 1994 NPS recommendation to Congress, which predicted that 45% of the park would

be completely free of all aircraft noise, 100% of the time, by 2010 (*Report to Congress*, §10.3.10.6). However, the NPS noise model at that time erred by neglecting to include jets and general aviation.

In the unrestored half of the park, concentrated air tour noise would be limited to about 25 miles of Canyon on the far west end. Some commercial tourist aircraft would also be noticeable between about river miles 180 and 205, with a very few in Marble Gorge (river miles 0 to 50).

Jets and general aviation would remain noticeable throughout the unrestored half, except near river rapids. Some jet and GA noise would also leak into small parts of the eastern (restored) half.

Without all five points, the plan would fall apart and genuine natural quiet could not be restored to any of the park.

5. Research

The observations in this analysis are based on a quarter-century of monitoring throughout the park, primarily by individuals and environmental organizations. Recent computer modeling by the FAA and NPS (the agencies) tends to reiterate these observations, although it is not as precise.

In the exceptional acoustics of the Canyon, an approaching Eurocopter 130 is audible up to 7 miles away. A DeHavilland Twin Otter Vistaliner is audible up to 11 miles abeam. A receding commercial jet is audible more than 20 miles away. General aviation aircraft tend to be louder than tour aircraft.

In panoramic locations, a single overflight is audible for an average of about 3 minutes, ranging from a fraction of a minute to more than 6 minutes.

6. Commercial Tourist Aircraft

This noise component is called “Air tour and Air Tour Related” by the agencies. The aircraft follow prescribed routes shown on the Grand Canyon VFR Aeronautical Chart (2001 edition), Commercial Air Tour Operators side. In the peak season, there are about one thousand flights per day, nearly all of them in the east and west ends of the park. In this context, “flight” means a pass in one general direction over the Canyon, i.e., one noise intrusion event as perceived by a person on the ground. A tour, or operation, generally consists of two flights, one outbound and one returning.

7. East End Tours

(a) Current situation

East end tours operate on two routes, the Dragon and the Zuni. Most helicopter tours follow the Dragon in both directions (north and south), while fixed wing tours and many helicopters fly north on the Zuni, climb over the north rim plateau, and return south on the Dragon. See Map 1.

These east end tours create a doughnut of noise encircling the park's Developed Corridor, a narrow zone of trails and modest tourist facilities between the north and south rim villages. The less crowded areas outside this Developed Corridor, where a visitor would normally seek quiet and solitude, now ironically suffer the greatest noise pollution.

Dragon tours are audible along the entire West Rim, (both developed and undeveloped sections) and as far west as the Grand Scenic Divide and Havasupai Point. They are audible as far east as the South Kaibab Trail (helicopters) and Matthes Point (fixed wings).

Zuni tours are audible from Saddle Mountain on the north, to Cape Solitude on the east, to Shoshone Point on the west, and at most points in between. They are especially noticeable around the Little Colorado River Confluence.

Trails heavily impacted by east-end tour noise include the Dripping Springs, Boucher, Hermit, West Tonto, East Tonto, Nankoweap, Horsethief, Beamer, Tanner, New Hance, Cape Final, Saddle Mountain, and Ken Patrick.

Five of the eight best backcountry viewpoints in the park—Sublime, Havasupai, Final, Cocopa, and Solitude—are impacted by east-end tours. The other three (Kanab, Great Thumb, and Fire) are under jet routes, and two (Great Thumb and Fire) are under a general aviation corridor.

River trips are impacted by both the Dragon and the Zuni, but more so by the Zuni, especially at the Confluence.

In the summer season, east end tours range from 250 to more than 500 flights per day. The number varies with the weather and other unpredictable factors, but is effectively limited by each operator's annual allocation (cap on the number of flights). If an operator exhausts his allocation, daily flights are reduced to zero for the remainder of the year. A daily cap might not, therefore, be an advantage to either operators or to visitors seeking quiet and solitude at the end of the season.

Dragon flights now comprise about 80% of east-end tour flights, with the remaining 20% on the Zuni. Under current rules, only helicopters are allowed to fly the shorter Dragon corridor in both directions (43 NM round-trip). However, FAA officials have said it would be safe for fixed wings to do so.

In part because of this rule, about 90% of Dragon flights are helicopters, while the Zuni flights are about evenly split between helicopters and fixed wings. (For safety separation, fixed wing tours are required to fly at least 500 feet above helicopter tours.)

Almost all Zuni flights, both fixed wing and helicopter, now return south via the Dragon, a roundtrip tour of 63 NM. To cross over the north rim plateau (not a destination for aerial tourists), both types of aircraft must ascend and descend 1500 feet.

(b) Economics

Helicopters currently make up about 80% of all east end tours. For many years, helicopters have gained market share over the fixed wings, even though helicopter tours cost about twice as much per mile or minute. Apparently, customers are attracted by the novelty of a helicopter ride, as nearly everyone has experienced an airplane.

In summer 2005, the Zuni-Dragon fixed wing tour price was \$100 per adult while helicopter tours on the same route averaged \$200. The shorter Dragon helicopter tour (which spends only 14 minutes over the Canyon) was about \$120. Fixed wing operators have long argued that if both types of aircraft were allowed to fly the same routes (as we propose), their true cost would be apparent to customers. The competitive advantage now enjoyed by helicopters would be removed, perhaps encouraging more tourists to choose larger fixed wings, thereby reducing the number of flights per passenger.

(c) Proposed seasonal solution

For many years, it has been clear that the only way to bring improvement to the east end, without eliminating air tours entirely, is to close either the Dragon or Zuni. However, both routes impact areas of great value to park visitors, on the rims as well as inside the Canyon.

Proposal 1 is a compromise solution that would concentrate all tours on the Dragon from September 16 through June 30, and all traffic on the Zuni from July 1 through September 15.

Under this proposal, the large area of the park east of the Developed Corridor would be free of air-tour noise during the fall, winter, spring, and early summer months. Hopi cultural sites at the Confluence would be protected during the seasons when ceremonies are held.

The park west of the Developed Corridor, including Point Sublime, Tiyo Point, Havasupai Point, Hermit Basin, the entire West Rim (frontcountry as well as backcountry), important archeological sites, and a number of trails and routes within the Canyon, would be free of air-tour noise for 77 summer days.

In the Developed Corridor itself, Zuni tours would be inaudible year round. Dragon tours are currently audible at a few locations (e.g. Plateau Point and one section of the South Kaibab Trail). However, with the completed conversion to noise-compliant aircraft and the adjustment of the route farther west, this audibility should be reduced or eliminated.

(d) Route modifications

For a given number of tours, Proposal 1 would increase Dragon flights about 25% for 288 days while quadrupling flights on the Zuni for 77 days. This is the compromise necessary to completely eliminate tour noise on these

routes for the remainder of the year. However, the routes would have to be modified, especially the Zuni, to mitigate what would otherwise be intolerable impacts.

For many years, the agencies and tour operators have proposed inserting a dogleg in the Dragon to move the entry-exit turn point southwest. This would reduce impacts on Hermit Basin and the developed viewpoints of the West Rim. Although it would increase noise at other backcountry viewpoints farther west, we accept the route shown on Map 1 if the Dragon is closed in summer, as we propose.

The North and South Bass trails would remain free of air tour noise all year. The route must not be farther west than shown on Map 1, to avoid impacts to the west side of Havasupai Point. (The point is separated by a ridge that blocks noise from the east.)

The Boucher and West Tonto trails would continue to suffer heavy impacts during the pleasant spring and late fall months, but would be free of air tour noise from mid-summer to early fall. The Dripping Springs trail would be improved for three-fourths of the year, and free of all air-tour noise for one-fourth of the year.

The proposed Dragon route is 50 NM, or 7 NM longer than the existing route.

On the Zuni, the Nankoweap Basin loop would have to be eliminated, to prevent otherwise intolerable impacts at the major summer frontcountry viewpoints of Point Imperial, Vista Encantada, and Roosevelt Point, as well as in the basin itself (Nankoweap and Horsethief trails). While some noise would leak into the basin, the wall of buttes to the south may block much of it. Even during the months when all traffic is on the Zuni, the frontcountry and most of the backcountry in the Nankoweap Basin would be quieter than it is now.

The major backcountry viewpoint near the Cape Royal Road—and one of the best in the park—is Cape Final. The southbound leg of the Zuni passes directly in front of it, but is now little used. To prevent intolerable impacts, it would have to be moved as far east as possible, without pushing flights too close to Desert View on the South Rim. The only way to seasonally eliminate tour noise at Point Sublime is to seasonally increase it at Cape Final. However, each point would be free of all tour noise for about half the period when the North Rim is open (normally, mid-May to mid-October).

Moving the Zuni route east would also reduce noise at Cape Royal, a major frontcountry destination. Fortunately, Cape Royal is most popular at sunset, when air tours are in curfew. Moving the Zuni a couple of miles east would increase noise at Unkar Delta, but that is not an important destination for river parties during the hot summer months.

Return flights should turn south as soon as possible after leaving the Confluence—over Chuar Butte—so that helicopter noise (which is projected most strongly to the front of the aircraft) is not aimed directly at the north rim.

The entry-exit turn points for the Zuni must be moved southeast as shown on Map 1, to prevent greatly increased impacts along the south rim and especially at the Grandview campsites, which are now directly under the

return Zuni. The Grandview campsites (in the national forest just outside the park, by the Grandview entrance) are in the highest region of the south rim, with the best mature Ponderosa pine forest and oak woodland. They are the best undeveloped campsites—indeed the only legal ones—along the South Rim between Hermit and Desert View. In winter, this is also the major ski area of the south rim.

The current entry point for most Zuni helicopters is about halfway between Papago and Pinal Points, or a half-mile east of the official entry point shown on the Grand Canyon VFR chart (over Papago Canyon). We propose to move that entry point, for all aircraft, an additional quarter-mile east, to just west of Pinal Point. This would allow the exit point, rarely used today, to be moved over the unnamed promontory 3/4 mile east of Zuni Point. That would reduce impacts on the New Hance trail and Moran Point, although increasing them slightly at Lipan Point and perhaps at Tusayan Museum. Like all of our proposals, this is a compromise solution. There is no ideal location for any air tour route.

The proposed Zuni route is 64 NM, the same length as the existing Zuni-Dragon route.

(e) Seasonal dates

Our proposed seasonal dates were carefully chosen, after much debate among stakeholders, to maximize protection in each season and to balance the noise impacts on both routes, taking all factors into consideration while minimizing complexity.

The Hopi cultural sites at the Confluence must be protected in the spring and fall, when the Hopi hold ceremonies, so flights must be on the Dragon during those seasons.

Since there is much more air tour traffic in summer, and tours fly for more hours of the day, the summer route should have a shorter period than the winter route to equalize the total impact. The proposed Zuni route also affects a larger area of the park, with more trails and routes and much more frontcountry. Therefore, we have given the Dragon a longer period than the Zuni.

In winter, the Zuni trails, particularly the Tanner, get more sun and are more accessible than Dragon locations, and are therefore more desirable to protect. The principle cross-country ski areas on both the north and south rims are also impacted by the Zuni.

While the Hermit Basin is accessible year round from Hermit's Rest, the roads accessing the north end of the Dragon are normally closed by snow from late October to June. Forest Road 328, giving access to the Dripping Springs Trail and other West Rim locations at the south end of the Dragon, is also often impassable in the winter months. For these reasons, we have put all flights on the Dragon during the winter.

The North Rim is normally open for about five months, mid-May to mid-October. We have split this period to give north rim visitors equal opportunities to enjoy both Dragon and Zuni locations without tour noise.

The July 1 opening date for Zuni air tours would re-

liably follow the opening of the backcountry roads to the north Dragon. The September 15 closing date for Zuni tours was chosen to coincide with the end of the motors season on the river, when river trips change style, quiet down, and take longer hikes off the river.

8. Shuttle Routes

(a) Las Vegas–Tusayan shuttles

These flights shuttle tourists between the Las Vegas region (North Las Vegas or Boulder) and Tusayan on the South Rim. They follow either of two straight, bi-directional routes: Blue Direct North (BDN) or Blue Direct South (BDS). See Map 2 and the Grand Canyon VFR chart.

Operators regard these flights as tours and market them as tours, but the agencies refer to them as “transportation” and therefore not subject to all the restrictions placed on tours.

A significant fraction of these flights are deadheads, i.e., empty aircraft returning to pick up another load of passengers. The agencies refer to these as “repositioning” flights.

BDN skirts the canyon on the north, passing over Mt. Dellenbaugh and crossing quickly over the river at RM 200. It is over the Canyon for only 10 NM. The direct North Las Vegas–Tusayan route via BDN is 150 NM.

BDS crosses over the upper Surprise Basin and crosses the river at RM 205. The direct Boulder–Tusayan route via BDS is 133 NM.

About half of all Las Vegas–Tusayan flights are on BDN and half are on BDS. However, the FAA operations data incorrectly shows all of the flights on BDN. The agencies’ model therefore significantly underestimates the area of the park impacted by these shuttle routes.

The Surprise-Separation Basin is regarded as some of the best backcountry in the Sanup Plateau (the western park). It has the best rim viewpoints (Twin Point and Kelly Point) and the longest rim-to-river route. However, flights on both BDN and BDS are currently noticeable throughout the upper basin, and BDS passes directly over Twin Point.

BDN and BDS also impact the West Rim (west of Hermit). When the Dragon is closed during the summer, they will be much more noticeable.

To solve this problem, we propose a modified BDN, for use by North Las Vegas–Tusayan shuttles (Map 3). It would run north of Mt. Dellenbaugh, outside the SFRA, with a turn point over Grassy Mountain (peak 6594 ft, 36°17' N, 113°28' W), then run southeasterly just west of the Twin Peaks check points, crossing the river at RM 193. The park at this point is only a half mile wide. This route would pass over Grand Canyon–Parashant National Monument, as BDN does today, but not over any existing or proposed wilderness or areas of concern.

To protect the West Rim (west of Hermit), a dogleg would be inserted southwest of the Tusayan airport, to keep the route at least 10 NM south of the park boundary. The direct route between North Las Vegas and Tusayan via the proposed BDN would be 157 NM, only 7 NM

longer than the existing route. It would be over the canyon (but outside the park) for about 15 NM, or 5 NM more than existing BDN.

We also propose a modified BDS (Map 3), for use by Boulder–Tusayan shuttles and the occasional Tusayan–Grand Canyon West shuttle. It would run south of the Canyon, outside the SFRA, and be about 137 NM, only 4 NM longer than the existing route.

(b) Whitmore–Bar Ten helicopter shuttles

These helicopter flights shuttle river passengers between Whitmore Rapids, on the Hualapai side of the river, and the Bar-Ten airstrip 7 miles outside the park. They are specifically exempted by the Overflights Act. From the airstrip, passengers are shuttled in 19-passenger noise-compliant planes to or from Las Vegas, Marble Canyon, or other airports.

Some river outfitters feel these shuttles are essential to their business, even though a trail less than 1 mile long with only 800 feet elevation gain leads from the river to a dirt road connecting with the airstrip.

However, the park at Whitmore is only a half mile wide, limiting the noise to a very small area of the park around the river. Flights occur only during the commercial river season, are allowed only for outfitters who have used them historically, and are effectively limited by river passenger quotas. The new Colorado River Management Plan allows these flights only between 7:00 and 10:00 AM. River parties can avoid the noise altogether by not passing through the area during those hours.

We do not propose any additional changes to these flights, other than the phase-in of noise-compliant helicopters.

(c) Supai–Tusayan helicopter shuttles (Brown 6)

Although it currently has few flights, the helicopter route between Tusayan and Supai Village (Brown 6) is quite noticeable along the West Rim (west of Hermit). When the Dragon is closed, it will be more noticeable. We propose that a dogleg be inserted in the route to pull it farther from the rim. Its exact location would be determined in consultation with the Havasupai.

9. West End Tours

The western 25 miles of the Canyon contains the deepest sheer gorge in the entire Canyon, some 3600 feet deep. The Canyon south of the river is Hualapai land, outside the park. Since the Overflights Act was passed, the Hualapai Nation has developed Grand Canyon West airport and associated tourist attractions on the rim and inside the Canyon. As a result, the west end has become the second noisiest area of the park, after the Dragon Corridor. However, the area of park affected is much smaller.

In addition to hundreds of Las Vegas-based fixed wing and helicopter tours, there are as many as 260 Over-the-Edge helicopter flights a day. These land on the floor of the Canyon and ascend back up through Quartermaster Canyon. They are entirely on Hualapai land, outside the

SFRA. The tribe regards all tourist flights that land on Hualapai land as exempted by the Overflights Act and essential to their economy.

The river in the West End is submerged by Lake Mead when the reservoir is full. NPS manages it to a lower standard than other sections of the river.

For these reasons, we are not proposing any change to west end flights, other than the phase-in of aircraft that meet the noise emission standards.

10. Noise-Compliant Aircraft

Even before the Overflights Act, air tour operators had begun to acquire aircraft which emitted somewhat less noise than other models of comparable size.

The agencies have since established noise emission standards for tour aircraft and a list of models that comply. They include the Vistaliner model of the DeHavilland Twin Otter, the Dornier 228, the Cessna 208 Caravan, and the new Eurocopter 130 (specifically developed in France to meet the Grand Canyon standards).

While none of these aircraft can be described as quiet, their noise does not travel quite as far as comparable models, so the area impacted by a given route is somewhat reduced. In 1994, NPS recommended to Congress that all commercial tourist aircraft flying within the SFRA be required to meet the noise emission standards, when the aircraft management plan was fully implemented (*Report to Congress*, §10.3.10.1). We concur. This date was later fixed by Presidential order as April 22, 2008.

In the same section, NPS also suggested that a *temporary* incentive route, to be phased out after five years, might encourage operators to begin acquiring noise-compliant aircraft. However, this has proved unnecessary as many operators have converted voluntarily. A large fraction of the tourist fleet is already in compliance.

We strongly oppose the idea of special incentive routes, since this would only spread noise over a wider area and reduce the area of natural quiet in the park.

In particular, we strongly oppose any attempt to reintroduce air tours to the 70 miles of Canyon made free of air tour noise by the 1989 and 2001 regulations. This area extends from Grand Scenic Divide to Toroweap Point (river miles 105-175).

The allocation system introduced in 2000 gives air tour operators what amounts to monopoly access to the SFRA. We believe continuation of this privilege is the only incentive needed for operators to acquire noise-compliant aircraft.

11. Low-Altitude General Aviation

(a) History and current situation

This noise component includes all aircraft—civilian and military—that fly in the uncontrolled VFR airspace between the surface and 18,000 feet MSL, except for the commercial tourist aircraft discussed above. Existing restrictions are shown on the Grand Canyon VFR Aeronautical Chart, General Aviation side.

In 1994, NPS recommended to Congress that the FAA study the traffic between 14,500 and 18,000 feet MSL to determine its impact on natural quiet. At that time, NPS assumed in its model that the ceilings of the flight-free zones would be raised to 18,000 feet (*Report to Congress*, §10.3.10.1 and 10.3.10.6). The ceiling of the SFRA (but not the flight free zones) was raised to 18,000 feet in 2001. However, the study was never done.

Since general aviation aircraft below 18,000 feet are uncontrolled and not captured by radar, the FAA has no data for them and they are inappropriately excluded from the latest noise model.

Private monitors have counted about ten to fifteen general aviation flights per day in each of three GA corridors (Tuckup, Dragon, and Zuni). The total for the whole park is perhaps on the order of a hundred flights per day.

Although greatly outnumbered by tours and jets, GA aircraft have a substantial noise impact since they are usually louder than tour aircraft and can fly over the entire park, provided they maintain certain minimum altitudes (Map 4). For about 165 river miles, or 60% of the Canyon's 277-mile length, the minimum altitude averages about 2500 feet AGL above the Canyon rims.

Another 37 river miles fall within four medium-altitude GA corridors, about 4 NM wide, which have a floor of 10,500 feet MSL (about 4500 feet above the rims), or 11,500 feet for northbound aircraft.

The remaining 75 river miles, or 27% of the Canyon's length, are covered by Flight Free Zones with current minimum altitudes of 14,500 feet MSL. Small craft without oxygen cannot fly above that altitude. But high performance aircraft can, and are often observed flying directly over (or in some cases through) the FFZs. The 14,500 foot minimum is unenforceable because it is impossible for an observer on the ground to tell whether an aircraft is above or below the line.

(b) Proposed FFZ ceilings

Flight Free Zones are the centerpiece of the Overflights Act. Their clear purpose was to create noise-free areas in the park. The current zones do not accomplish that goal because they are riddled with corridors and aircraft can fly over the top. General Aviation and military aircraft are now audible throughout the FFZs.

To solve this problem, we propose that the ceiling of the eastern FFZs be raised to match the SFRA ceiling of 18,000 feet MSL, so that they are truly flight free. See Map 5. We do not propose any change for the Sanup FFZ.

(c) Proposed GA corridors

We propose to close one GA corridor (Fossil Canyon), and to open the Dragon and Zuni GA corridors in alternate seasons, corresponding to the tour route seasons below them. Although seasonal closures are a novel solution, temporal closure of airspaces is well established. Military airspaces are opened and closed daily or weekly, and general aviation airspaces are sometimes closed for special events with as little as one day's notice.

(d) Proposed FFZ boundaries

As shown on Map 5, the boundaries of the FFZs would be adjusted to conform to the modified Dragon and Zuni routes beneath.

On the north side of Kanab Basin, the noise of GA aircraft flying along the FFZ/park boundary spills into the park and is audible throughout much of the Basin. Some GA aircraft cross the line and loop through the Flight Free Zone itself. Therefore, we propose moving the boundary in this vicinity several miles north, over the Kanab Wilderness of Kaibab National Forest.

This boundary change was recommended to Congress by NPS in 1994. However, the boundary changes we are proposing are much more modest than those of NPS and would not have a significant impact general aviation. In any given season, GA aircraft could still overfly about 170 river miles, or 61% of the Canyon's length, most of it at low altitude.

(e) Military aircraft

Before the mid-1990s, the park had four low altitude Military Training Routes (MTRs), which crossed the Canyon over Marble Gorge and the Shivwits-Sanup Plateaus. At the request of NPS, they were voluntarily closed by the Air Force.

However, unauthorized sightseeing flights by military pilots, over or directly through Flight Free Zones, are not uncommon. Military aircraft are much louder than civilian aircraft, so their noise impact is much greater. They also present an extreme danger to other aircraft.

In the past, there have been problems with inconsistencies between the military and civilian aeronautical charts. The agencies should ensure that no-fly zones and minimum altitudes are accurately shown on military charts.

(f) Hotline for illegal flights

Visitors regularly observe unauthorized flights, both civilian and military, either through the FFZs or below the rim, sometimes dangerously close to the ground. Such flights have most often been seen in the Toroweap-Shinumo FFZ, where they are unlikely to be observed by rangers or tour operators. To improve the chance of identifying violators, we propose establishing and advertising a local hotline in the park. Witnesses could report violations as they occurred, on their cell or satellite phones. There is a national hotline (1-800-FLY SAFE), but its staff would be unfamiliar with the geography of the park and unable to immediately follow through.

12. Jets

(a) History and current situation

This noise component includes all aircraft in the controlled, IFR, Class A airspace above 18,000 feet MSL. The great majority are commercial airliners flying between 28,000 and 40,000 feet MSL at a speed of about 500 mi/h (430 kt). The remainder are small corporate-type jets (classed as general aviation by the FAA) and military aircraft. All flights in this airspace are positively controlled by the Los Angeles control center. There are about one thousand flights per day (24 hours) over the Canyon, concentrated in about six major bundles.

Jets were first identified as a major noise problem in the 1971 Black study, quoted on page 18. NPS monitoring in the 1970s reinforced that conclusion. In 1994, NPS recommended that the FAA study the impacts of jets on the natural quiet of the park (*Report to Congress*, §10.3.10.4). However, that study was not done until mandated by the Court of Appeals in 2002. The state-of-the-art research found that jets are audible virtually everywhere in the park, except near river rapids. According to the agencies' noise model, jets alone are out of compliance (audible more than 25% of the time) in 99% of the park. Hence, even if air tours and general aviation were completely eliminated, it would be impossible to comply with the Overflights Act without addressing jets. Most of the park would continue to become noisier as jet traffic increases.

Among people with little experience in the Grand Canyon backcountry, there is a perception that jets are less noticeable than air tours. On the contrary, in the great majority of the park, jets are both louder and more numerous than air tours. The only exception is under or near tour routes. A jet flying overhead is 5 to 7 miles from the observer. Since jets emit far more noise than tour aircraft, a jet overhead is louder than a tour craft only a few miles away. The bare, curving Canyon walls amplify, focus, and reverberate the noise so that it is much more noticeable than would be the case on a flat plain. (The agencies' noise model ignores these acoustical effects because they are too difficult to predict mathematically.)

Unlike tourist aircraft, jets fly at all hours of the day and night. Out on the Esplanade, the Tonto Plateau, or the Canyon rims, it is not unusual to be awakened by a jet at 6:30 in the morning, to hear several jets simultaneously, or to hear continuous jet noise for 10 or 15 minutes at a stretch.

Even on the river, jets are noticeable enough that when all aircraft were grounded nationwide on September 11, 2001, river guides immediately noticed something was amiss.

(b) FAA opposition

The FAA has long opposed moving any jet routes away from the park. The agency is concerned that it would establish a precedent that other parks might wish to follow. However, the Overflights Act is unique. No other park has a mandate to both restore natural quiet and

to consider jets in that restoration.

In September 1987, a high-level meeting was convened in Tusayan to plan the original flight restrictions mandated by the Act, signed into law the previous month. At that meeting, attended by Senator McCain, the Undersecretary of the Interior, and NPS leaders, the ranking FAA official said that moving jet routes “is very easy to do. We do it every day. But we don’t want to do it.”

This is still true. The FAA routinely closes vast high-altitude military airspaces (restricted areas and military operating areas) in the southwestern states, with as little as 6 hours notice. See Map 7. The area of the proposed high-altitude flight free zone in the Heart of the Park (green outline) is insignificant by comparison.

(c) Routes analysis

Our jets proposal is based on careful on-the-ground research and is designed to protect the Heart of the Park without disrupting the national air transport system. The proposed high-altitude flight-free polygon is the smallest that would accomplish the task. There would be some noise leakage in the northwest and southeast corners of the polygon.

It is essential to move jet routes in such a way that one noise-sensitive area in the Heart of the Park is not protected at the expense of another.

Some 70% of U.S. jet traffic is between only 30 major cities. The nearest such cities to the Heart of the Park are Las Vegas, 150 NM west, Phoenix, 160 NM south, Salt Lake City, 275 NM north, Los Angeles, 340 NM west-southwest, and Denver, 400 NM northeast. Other cities with a major noise impact on the Canyon are Seattle, 800 NM northwest, Chicago, 1200 NM northeast, and New York, 1800 NM east.

Note on Map 7 that jet tracks across the country often do not follow the most direct route. In many cases, they curve to avoid military airspaces. The Phoenix–Seattle bundle of tracks, for example, bends far eastward around a narrow projecting corner of the Desert MOA in southwest Utah, pushing it over the Canyon’s noise-sensitive Kanab Basin. A direct Phoenix–Seattle route would bypass the basin some 40 NM farther west.

A direct Denver–Los Angeles route passes to the north and would have no noise impact on the Heart of the Park.

Direct Los Angeles–Chicago and Los Angeles–New York routes (1500 NM and 2100 NM, respectively) do pass diagonally over the southeastern Heart of the Park. However, moving them an average of 15 NM south, as we propose, would add less than half a mile to either of these long routes. This difference—less than a quarter of a runway length—is utterly insignificant compared to the wide detours jets make to get in and out of airports, avoid weather, detour around military airspaces, take advantage of the jet stream, and other factors.

A direct Phoenix–Salt Lake route, which would go over the park’s North Rim village, is 440 NM long. Moving it 17 NM east outside the park would add only 1.3 NM to that length. But Phoenix–Salt Lake flights do not

follow a direct route today. They bend 8 to 12 NM west, putting them over more noise sensitive areas such as the Shinumo Basin and Point Sublime (Map 6D). (The Sunny MOA, southeast of the park, extends from 12,000 to 18,000 feet MSL and is not a barrier to jet traffic. It is used only occasionally, by 24 hour notice).

Las Vegas flights have relatively little impact on the Heart of the Park (Map 6E). There is one dense approach bundle that zigzags inexplicably over the Kanab Basin, but it could easily be moved a few miles north. There is also a bundle crossing the southeast corner of the park, which could easily be moved a few miles south.

Map 7 shows that many areas of the country have far denser jet traffic than the Grand Canyon. (This is particularly true in the eastern states, which are off the map.) For example, there is a very heavy bundle from Phoenix to Dallas–Ft Worth that bends south over El Paso to bypass military airspaces in southern New Mexico.

Our proposal would not impact cities and towns, since the region surrounding the park is virtually unpopulated.

There is a plan to allow “free flight” in the future. Jets could choose their own cross-country route rather than follow one assigned by FAA controllers, except over urban and restricted airspaces. This plan would not affect our proposal.

It is clear that restoring quiet to the park is a political problem, not a technical or economic problem.

C. Importance of Natural Quiet

For more than a century, the remarkable natural quiet of the Grand Canyon has been regarded as one of its greatest attributes. Below are excerpts from the Canyon literature, arranged chronologically, illustrating this critical importance. Compare the dramatic change after 1970, as air tours and jet travel mushroomed.

The river rolls by us in silent majesty; the quiet of the camp is sweet; our joy is almost ecstasy.

—John Wesley Powell, 1869, *Journal*

It was a rather beautiful life [early 1900s] because we could run and play and do as we liked out there on the rim with no one to bother us; no noises, streetcars, airplanes, or anything.... We lived at the Canyon, we loved the Canyon, we appreciated it all, we didn't look at it like just a big hole in the ground....

—William G. Bass,
in Stephen Maurer, *Solitude and Sunshine*, 1983

One feature of this ever varying spectacle never changes—its eternal silence.... there is always that same silence—a silence that keeps its secret.

—Zane Grey, 1906,
El Tovar Hotel register

A silence reigns everywhere. The sun comes up over the Painted Desert through a haze of spectrum colors but there is no sound, and it goes down over the Uinkaret Mountains in all the glory of crimson and purple, but the silence is not broken. In the early morning you may hear at certain places the respiration of the River, or the sough of the pinyons along the Rim, or the jangle of the jays in the pines, but they are only momentary happenings. There may be flying shadows of clouds moving across the Canyon, or misty rain falling into its depths, but these are silent things that creep in and out with an imperceptible footfall.... The stillness seems like stellar space.

And out of the silence perhaps one gathers the feeling of repose.... Everything is done with calmness.... Therefore is there peace, and with it repose and silence—the silence that suggests eternity.

—John Van Dyke, 1920,
The Grand Canyon of the Colorado

The most general theme running through those entries [Phantom Ranch visitors' registers of 1920s through 1940s] has to do with peace, quiet, and isolation; these attributes are lauded in entry after entry, year after year.

—Elizabeth Simpson,
Recollections of Phantom Ranch, 1979

I do not want a Coney Island. I want as much wilderness, as much nature preserved and maintained as possible.... I think the parks ought to be for people who love to camp and love to hike and who like to have...a renewed communion with Nature. I think if we make it too easy for airplanes to go whizzing over our parks that we destroy a great deal of their value.... If we encourage the airplane business, we will see Glacier, Yellowstone, and Yosemite from the air at a hundred miles an hour. I don't see any sense in catering to that sort of thing.

—Harold Ickes, Secretary of the Interior, 1934,
address to national park superintendents

There was in this immensity...a silence so profound that soon all the noises from the life about us on the rim were lost in it, as if our ears had been captured forever, drowned in these deeps of quiet.

—J. B. Priestly, 1937,
Midnight on the Desert

Occasionally an airplane hurtling across the continent passes overhead. [In 1956] two of them collided improbably above the Canyon and fell into its depths. These—or at least some of them—are good things to have but not unmitigated comforts. They suggest by what a narrow margin (and possibly for how short a time) such primitive, isolated spots as my perch [Point Sublime] may continue to exist.

How many more generations will pass before it will have become nearly impossible to be alone even for an hour, to see anywhere nature as she is without man's improvements upon her? How long will it be before—what is perhaps worse yet—there is no quietness anywhere, no escape from the rumble and the crash, the clank and the screech which seem to be the inevitable accompaniment of technology? Whatever man does or produces, noise seems to be an unavoidable by-product. Perhaps he can, as he now tends to believe, do anything. But he cannot do it quietly.

Perhaps when the time comes that there is no more silence and no more aloneness, there will also be no longer anyone who wants to be alone. ...

...At least a few do still consciously seek quietness and some degree of solitude; a great many more seek it less consciously, but seek it nonetheless. If this were not so, the various national parks would not be so persistently visited. When all possible discount has been allowed for the irrelevant motives, for the frequent failure to get what the visitor presumably came for, and for the perverseness of many who try to avoid the very things which the parks have to offer, the fact still remains that many find (and many others do not find only because they do not know how to find it) that brief experience with solitude, silence, and a glimpse of nature herself which...they do feel the need of. As a matter of fact, the deliberate search

for them is a modern phenomenon not, I think, because they were never before enjoyed but because they were taken for granted. Only when they began to be scarce...and solitude rather than company had to be sought after, did the great empty spaces become attractive....

These are things which other nations can never recover. Should we lose them, we could never recover them either. The generation now living may very well be that which will make the irrevocable decision whether or not America will continue to be for centuries to come the one great nation which had the foresight to preserve an important part of its heritage. If we do not preserve it, then we shall have diminished by just that much the unique privilege of being an American.

—Joseph Wood Krutch, 1957,
Grand Canyon: Today and All Its Yesterdays

Even before I had accepted what I saw, I heard the silence; felt it like something solid, face to face.... A silence so profound that the whole colossal chaos of rock and space and color seemed to have sunk beneath it and to lie there cut off, timeless.

And in that quiet place I found that I had moved inside the silence. ... And I began to understand that the silence was not, as I had thought, a timeless silence. It was a silence built of the seconds that had ticked away, eon after eon.... I saw that by going down into that huge fissure in the face of the earth, deep into the space and the silence and the solitude, I might come as close as we can...to moving back down through the smooth and apparently impenetrable face of time....

I found myself listening. It was so still that there was nothing to hear but silence....

When I had finished my dinner I lay still and listened to the silence....As I lay in the darkness, staring up at the stars and hearing how the silence was magnified by the drip, drip, drip, of water, I knew that after all my days of effort and silence and solitude I was almost ready to move inside the museum [of earth history that is the Canyon]....

...[It was] a world that space and silence and solitude had set richly apart from the present....

[Expressing concern about then-proposed dams in the Canyon] The silence will be the most certain and the most tragic loss: the silence that I met face to face, like something solid, in the first moment I stood on the rim; the silence that encompassed me and caressed and soothed my mind and carried me out beyond my own time to a new sense of inclusion with rock and beaver and rattlesnake.... And without this envelope of silence the Grand Canyon of the Colorado will no longer be a vast natural museum of the earth's history. It will no longer be a museum at all....

[Note: Fletcher mentions the silence of the Canyon forty times throughout his book, far more than he mentions all other features of the Canyon combined.]

—Colin Fletcher, 1967,
The Man Who Walked Through Time

Aircraft, including high altitude and medium altitude jets, two-engine tour planes, single-engine private planes, and helicopters provide an almost continuous intrusion at all sites. Probably the major ingredient of experience in the Grand Canyon to most people is its unique and all encompassing quiet. People react to this much like they would to a great cathedral, by lowering their voices. It surely seems valid today that this ubiquitous aircraft noise is clearly degrading the canyon experience for most people.

—Dr. Charles Black, 1971,
Northern Arizona University study

Many feel that airplanes and helicopters are such a problem that they seriously reduce the enjoyment of a Canyon hike, and a majority feel that the use of aircraft over the Canyon should be greatly restricted. ...A majority of trail users feel that helicopters are not justified for scenic flights over the Grand Canyon. Most hikers believe that such flights detract from the feeling of being in a wilderness.

—William Towler, 1977,
survey of Grand Canyon hikers,
University of Arizona Master's Thesis

The prevalence of airplanes and helicopters in and above the Grand Canyon is a distracting, irritating, nuisance which should no longer be tolerated by anybody. I look forward to the day when all river runners carry, as part of their basic equipment, a light-weight portable anti-aircraft weapon armed with heat-seeking missiles.

—Edward Abbey, 1982,
foreword to Kim Crumbo,
River Runner's Guide to the History of the Grand Canyon

The following excerpts are from recorded oral testimony at public hearings on Grand Canyon aircraft, held by NPS in 1985 and 1986.

Touring the Canyon by aircraft is an offensive, expensive, elitist practice that caters to the wealthy few while degrading or ruining the experience of the vast majority of people who visit to see and experience the natural beauty and quiet, without man-made intrusions.

The most reasonable course to deal with this problem is elimination of all aircraft [overflights]. Anyone familiar with the canyon country knows the tremendous distances that sound travels and that the limits proposed here [by the park service] do little or nothing to limit the noise. The park service has done a great injustice to the American people in refusing to consider anything but proposals that would continue the current aircraft onslaught.

Saying that aircraft only disturb people for a small fraction of the time is like saying it's O.K. to have piles of garbage along a trail if they are spaced every so often...The extreme irritation caused by an encounter with these noise monsters lingers for a very long time.

The calm and serene feeling that one gets in such a quiet place takes time to happen, yet is dashed to pieces in an instant. This peace does not simply return automatically when the aircraft departs, as some people would have you believe.

—Charles Connor

I have a congenital, continually increasing neuromuscular disease. I spent five summers as a child with my legs immobilized in casts, my toes wired together, my ankles broken and pinned... One of my best pain-free summers was spent at the Grand Canyon. My parents drove all the way from Oklahoma to camp and drive along the rim. I still remember the... peace, serenity, and solitude I felt for the very first time as I walked along the rim. These are things you never forget. I want my children, my grandchildren to have this experience too.

But when I returned to the Canyon a few years ago, the aircraft were there, all the time, incessantly. One does not have to hike, mule ride, or raft into the Grand Canyon to be disturbed by aircraft. On just a short walk along the rim, the solitude is destroyed by the constant noise of aircraft... I resent the sleazy businessmen exploiting the handicapped to make a greasy dollar. The handicapped do not need aircraft to see the Grand Canyon.

—Tanya Chliwnyj, realtor

I'm 76 years old. I have arthritis, a pacemaker, wear a hearing aid, comb my hair with a washcloth. No one can see the Canyon in an hour, in any way. All you will remember are a lot of colored rock walls.... It isn't only hikers who are disturbed by the flying machines. People driving along the road and stopping at many viewpoints are also denied the quiet that is so much a part of 'seeing' the Grand Canyon. I favor a return to the quiet.

—Roger Irvin, former park maintenance worker

I'm 66 years old and I can still hike in the Canyon. Nobody needs to see the Grand Canyon at the expense of other people. If it disturbs others, it ought to be stopped. Aircraft [overflights] should be completely eliminated.

—Katie Lee, folksinger

I felt like I was back in Vietnam. You're never out from under them [aircraft]. Once a chopper came blasting over the rim and the buddy I was hiking with hit the deck like he'd been mortared.... They [air tour operators] talk about their 'right' to fly the Canyon, but as Justice Holmes said, 'your right to swing your arm ends where my nose begins.'

—Mike Fleming

I'm speaking for my kids and their kids.... I'd like to say we ought to get rid of every single aircraft in Grand Canyon, but there's not much use in saying that.... We've heard of the thousands of tourists who have to see Las Vegas and the Grand Canyon in the same afternoon. What are we gonna do with them?... Money talks....

Now what I envision is the first week of every month we'll designate Internal Combustion Engine Week. Now

visualize this if you will: the baloney boats all lined up behind one another with their little motors just a-chugging away, racing down the Canyon. Right above them, the helicopters, nose to nose, and above them wave after wave of aircraft. You've all heard aircraft people say how much they enjoy seeing aircraft and listening to them, so what the heck, a few hundred more won't make any difference, right? And then when the clock strikes twelve on the last day, I say get those darn motors out of the Grand Canyon.

—W. G. Wynnell, river guide

1994 visitor survey

The value statement rated by respondents was "It did not matter how many aircraft, how loud, or how long I heard sounds from aircraft; just hearing any sounds from aircraft is what bothered me."

For all five user groups, [this] value statement received the greatest amount of agreement [of any of the four attitude statements about aircraft exposure in the survey]. About one-half of the river oar (57 percent) and fall backcountry (47 percent) respondents agreed with the value statement. ...

These results present an interesting dilemma for park management. Even if restrictions (or more restrictions) were placed on aircraft overflights to decrease visitors' exposure, it is possible that visitors would still report a significant level of impact, as long as they can hear or see some aircraft. The findings indicate the personal values held by respondents were much more important than specific exposure characteristics.... Therefore, changing the level of aircraft overflight exposure may do little to change visitors' response.

—Harris Miller Miller & Hanson, Inc., 1994,
Grand Canyon visitors survey



I see doors open over doorsills
And always another door and a doorsill.
—Carl Sandburg
Slabs of the Sunburnt West, 1922